

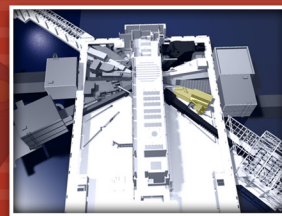
INSTRUMENT

BEAM LINE

12

SPALLATION NEUTRON SOURCE

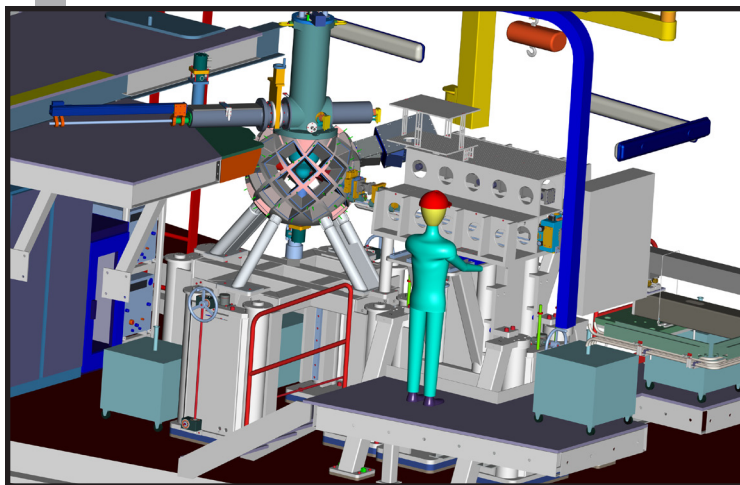
Fact Sheet



TOPAZ – SINGLE-CRYSTAL DIFFRACTOMETER

The TOPAZ Single-Crystal Diffractometer (SCD) is designed to perform elastic scattering experiments under controlled environmental conditions to probe material structures and responses. Use of the same single-crystal sample for X-ray and neutron diffraction was the guiding design principle of TOPAZ, a versatile and variable-environment SCD for neutron scattering. Data are collected on samples between 1 and 10 mm³, and expected average unit cell dimensions are around 50 x 50 x 50 Å³ for compounds of moderate complexity. The goal for TOPAZ is the capability to collect data in a matter of hours rather than days. Materials investigated include functional materials of the high-T_c superconductor perovskite family; magnetic superstructures in perovskites and spinels; the molecular basis of future high-density, three-dimensional

storage materials; and catalytic precursors, metalhydrides, and organometallics. Options to polarize the neutron beam for magnetic scattering experiments are included, as well as the ability to record Bragg intensities and diffuse scattering at cryogenic and elevated temperatures. A polarized incident neutron beam and magnetic field option on the sample will help scientists decipher complex and directional magnetism and magnetic transitions.



SPECIFICATIONS

Moderator	Decoupled poisoned hydrogen
Source-to-sample distance	18 m
Sample-to-detector distance	39–45 cm
Angular detector coverage	1.7 sr (14 detectors)
Detector pixel size	1 mm
Detector angles	20–160°
Wavelength bandwidth	3.0 Å
Accessible wave length	0.5–1 Å
Frame 1	0.5–3.5 Å
Sample size	1 mm ³ < S < 10 mm ³
Neutron beam divergence on sample	15 mrad < d < 25 mrad

Status: Operational

APPLICATIONS

TOPAZ can address problems and greatly expand the range of materials explored in chemistry, earth sciences, materials science and engineering, solid-state physics, and biology. It can also assist in studies of therapeutics and medical compounds, such as aspirin and paracetamol, to show differences in hydrogen locations and bonding, helping scientists better understand a material's individual effectiveness.

FOR MORE INFORMATION, CONTACT

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<http://neutrons.ornl.gov/instruments/SNS/TOPAZ>



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